



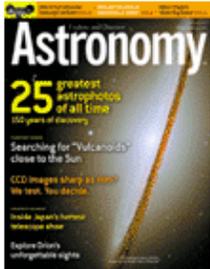
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## SCIENCE NEWS COSMOLOGY

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### Does dark energy really exist?

*XMM-Newton's survey of galaxy clusters suggests dark energy doesn't exist.*  
by Amanda Gefter

A mystery that has been haunting the fields of physics and **cosmology** has just grown deeper. **Dark energy**, that stealthy ghost that lurks in the shadows of the **universe**, is now believed by most scientists to be a strange but significant occupant of the **cosmos**, an unidentified antigravity that is stretching the very fabric of space. In fact, all the evidence — beginning in 1998 with the discovery of the universe's accelerating expansion — has added up to an unsettling cosmic recipe: 4 percent ordinary matter, 23 percent **dark matter**, and 73 percent dark energy. But now, a recent X-ray survey of distant **galaxy** clusters suggests that perhaps dark energy is not the secret ingredient after all.

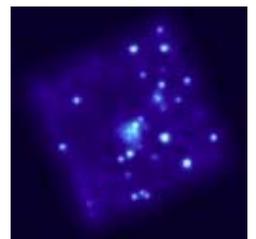


XMM-Newton studies the X-ray universe from Earth orbit.  
ESA

Using the European Space Agency's XMM-Newton space observatory, a team led by Alain Blanchard of the **Astrophysics** Laboratory of the Midi-Pyrénées Observatory in France found galactic clusters whose distance corresponds to nearly halfway back toward the beginning of time. Composed of hundreds or thousands of galaxies, clusters form over billions of years as **gravity** pulls matter together. But roughly five **billion** years ago, dark energy became the dominant force in the universe, expanding space and rendering it ever more difficult for gravity to sculpt its masterworks.

As dark energy dilutes the matter, galaxy clusters should become fewer and farther between. So when Blanchard's team surveyed clusters that predate the onset of dark energy, they should have found many more than exist today. Instead, they found significantly fewer — suggesting that matter has continued to gravitationally coalesce over time, that there is four times as much dark matter as previously believed, and that dark energy is nothing more than a fantastic illusion.

Still, the numerous lines of evidence for dark energy greatly outweigh the evidence against it. "In a very short time, the idea of dark energy has gone from an unlikely speculation to by far the leading contender for most of the stuff in the universe, despite the fact that our theoretical understanding of dark energy remains woefully inadequate," says University of Chicago physicist Sean Carroll. "It is nevertheless so popular because it is indicated by a wide variety of independent observational probes: supernovae, large-scale structure, the microwave background, the age of the universe, and more. For dark energy not to exist would require a truly pernicious conspiracy of effects that are



This X-ray image of a



tricking us into misinterpreting a very disparate collection of experiments.”

galaxy cluster was taken  
by the XMM-Newton  
spacecraft.  
ESA

If dark energy is vanquished by these recent observations, cosmologists will have to rethink the perplexing universe they've grown to know and love. But if dark energy holds strong, the new data begs for explanation. Perhaps astronomers don't fully understand the behavior of galaxy clusters. Or perhaps this particular survey is not representative of the average number of clusters in the young universe. "Our measurement is consistent with Chandra's previous measurements," explains Blanchard, "but given the importance of the subject we may still consider that the study comprises too limited a number of clusters. We need more accurate data with good statistical samples."

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